

Five-Year Review Report

Second Five-Year Review Report

for

Missouri Electric Works Site

Cape Girardeau

Cape Girardeau County, Missouri

August 2009

PREPARED BY:

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Executive Summary

Three operable units (OUs) have been defined for the Missouri Electric Works (MEW) Superfund site (Site) that includes OU 1 (soils), OU 2 (groundwater), and OU 3 (wetlands). The remedy for OU 1 has been completed and the protectiveness determination for this OU is the basis for this review. Protectiveness determinations cannot be made for OU 2 since the remedy has not been implemented nor for OU 3 where a remedy has not been selected.

The soil remedy for the Site included excavation, processing, and treatment of Polychlorinated Biphenyl (PCB) contaminated soils using thermal desorption technology. Successful treatment of the soil was confirmed through soil sample analyses, and the treated soil was used to backfill the excavated areas. The entire area was capped with a contaminant-free soil. The upper one foot of the cap was enriched to support vegetation. The soil remedy was complete with the acceptance by the Environmental Protection Agency (EPA) of the Soil Remedial Action Report during September 2000. The trigger for this five-year review is the start of remedial action (RA) on-site construction, which occurred June 7, 1999.

The groundwater portion of the remedy at the Site has not been implemented. After the Record of Decision (ROD) was signed in 1990 (1990 ROD), new hydrogeologic information was obtained by the Missouri Electric Works Steering Committee (MEWSC). This new information indicated that there was a possibility that PCBs were present in the groundwater at depths greater than three hundred (300+) feet. Solution features were encountered at depths of 110, 220, and 315 feet below ground surface (bgs). The solution cavities at depths of 220 and 315 feet bgs were mud-filled; the mud and water were contaminated with PCBs. A focused Remedial Investigation/Feasibility Study (RI/FS) for groundwater has been conducted for the Site.

EPA issued a second ROD in 2005 (2005 ROD) which addressed two groundwater regimes that had been impacted by contamination from the Site. Groundwater monitoring and institutional controls (ICs) were selected as components of the remedy for the contaminated groundwater in the fractured, karst bedrock. Active restoration of this groundwater unit was determined by EPA to be technically impracticable from an engineering perspective, so a Technical Impracticability (TI) waiver for meeting the groundwater cleanup levels (maximum contaminant levels or MCLs) was invoked by EPA in the 2005 ROD. Monitoring, ICs, and Monitored Natural Attenuation (MNA) were selected as components of the remedy for the contaminated groundwater in the alluvium south of the MEW property. These remedies have not yet been implemented. Special Notice Letters seeking the performance of this work were issued by EPA to potentially responsible parties (PRPs) on March 4, 2009. An offer to perform this work, under certain conditions, was received from the Missouri Electric Works Steering Committee (MEWSC) on May 6, 2009. Consent Decree (CD) negotiations are currently underway. The MEWSC has requested that all remaining work be addressed through one settlement document. Accordingly, the CD currently being negotiated includes all remaining work: the remedial design/remedial action (RD/RA) for groundwater, and the remedial investigation/feasibility study (RI/FS), and the RD/RA for the wetlands area.

While there are no current unacceptable human exposures to contaminated groundwater in the immediate area, the threats posed by the contaminated groundwater have not yet been addressed. The groundwater components of the 1990 ROD have been superseded by the 2005 ROD. The 2005 ROD has not been implemented; therefore, protectiveness has been achieved only for the soils. The potential threat to ecological systems or the environment will be assessed as part of the work to be performed pursuant to the CD that is currently being negotiated.

The remedy at OU 1 is protective of human health and the environment. All exposure pathways and risks are controlled and the remedy continues to function as intended by the 1990 ROD and 1994 Explanation of Significant Differences (ESD). Exposure assumptions, cleanup values, toxicity data, and the Remedial Action Objectives (RAOs) remain valid.

The remedy at OU 2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

A protectiveness determination of the remedy at OU 3 cannot be made until further information is obtained. Further information will be obtained through the collection of data to determine the ecological risks for the Site. It is expected that these actions will take approximately three years to complete; at that time a protectiveness determination will be made.

Five-Year Review Summary Form, cont'd.

Issues:

ICs addressing potential groundwater exposures have not been placed on the Site; this effort is currently being negotiated as part of the work under the new CD.

A wetland area south of the MEW property has been impacted by contamination from the Site. Additional investigation is necessary so that an Ecological Risk Assessment can be performed.

The groundwater monitoring data collected in the fractured bedrock and alluvium during the focused groundwater design investigation indicates that there are two contaminant plumes; however, they do not appear to be migrating. Continued monitoring of the groundwater is needed to verify this.

Groundwater parameter data has been collected from the alluvium and indicates that natural attenuation is occurring. Continued monitoring of the alluvium groundwater, both for contaminants and those parameters necessary for natural attenuation, needs to be performed.

Maintenance to secure the property, replacing monitor well locks, removing compromising vegetation, and maintaining security fencing must be conducted.

Recommendations and Follow-up Actions:

ICs for groundwater, both fractured bedrock and alluvium, need to be established. The ICs are identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

A focused remedial investigation and ecological risk assessment are needed for the wetland area. A ROD for the wetland (OU 3) will be needed after the data is available to identify any actions that may be required for protectiveness of the environment. These efforts are identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

Another set of monitor wells is needed in the wetland area to verify that the extent of the contaminant plume has been adequately identified. Installation of up to three wells is identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

Regular monitoring of both the fractured bedrock and alluvium groundwater is needed to verify that the plumes are not migrating and that contaminant concentrations are stable or decreasing. Groundwater monitoring, at regular specified intervals, is identified as part of the work to be performed pursuant to the CD that is currently being negotiated.

Additional groundwater data will be collected to evaluate whether parameters necessary for natural attenuation continue to exist in the alluvium. This work is a part of the effort to be performed pursuant to the CD currently being negotiated.

Implement security measures and maintain the integrity of the monitoring wells and fencing.

Protectiveness Statement(s):

The remedy at OU 1 is protective of human health and the environment. All exposure pathways and risks are controlled and the remedy continues to function as intended by the 1990 ROD and 1994 ESD. Exposure assumptions, cleanup values, toxicity data, and the RAOs remain valid.

The remedy at OU 2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

A protectiveness determination of the remedy at OU 3 cannot be made until further information is obtained. Further information will be obtained through the collection of data to determine the ecological risks for the Site. It is expected that these actions will take approximately three years to complete; at that time a protectiveness determination will be made.

Other Comments:

EPA issued a new ROD for OU2 in 2005. EPA and the MEWSC are currently negotiating a CD that will implement the remedies identified in the 2005 ROD. The groundwater remedy identified in the 1990 ROD is no longer applicable and is superseded by the 2005 ROD. Ecological risk will be addressed through the CD that is currently being negotiated.

Chemicals of Potential Concern (COPCs)

Detected Organics	Undetected Organics	
1,1-Dichloroethane	1,1,2,2-Tetrachloroethane	Benzo(k)fluoranthene
1,2,4-Trichlorobenzene	1,1,2-Trichloroethane	Bis(2-Chloroisopropyl) Ether
1,2-Dichloroethene Total	1,2-Dichloroethane	Carbon Tetrachloride
1,3-Dichlorobenzene	1,2-Dichloropropane	Chlorodibromomethane
1,4-Dichlorobenzene	2,4,6-Trichlorophenol	Dibenzo(a,h)Anthracene
2-Chlorophenol	2,4-Dinitrotoluene	Dibenzofuran
Aroclor-1260	2,6-Dinitrotoluene	Hexachloro-1,3-Butadiene
Benzene	3,3-Dichlorobenzidine	Hexachlorobenzene
Bis(2-Chloroethyl) Ether	4,6-Dinitro-2-Methyl Phenol	Indeno(1,2,3-cd)Pyrene
Bis(2-ethylhexyl)phthalate	Aroclor 1016	2-Methylnaphthalene
Bromodichloromethane	Aroclor-1221	Nitrobenzene
Chlorobenzene	Aroclor-1232	Pentachlorophenol
Chloroform	Aroclor-1242	Vinyl Chloride
Naphthalene	Aroclor-1248	Bis (2-Chloroethoxy) Methane
N-Nitrosodi-n-propylamine	Aroclor-1254	4-Bromophenyl Phenyl Ether
Tetrachlorethene	Benzo(a)anthracene	4-Chlorophenyl Phenyl Ether
Trichlorethene	Benzo(a)pyrene	4-Chloro-3-Methylphenol
	Benzo(b)fluoranthene	

Quantitative evaluation of the risks associated with these chemicals is not possible due to the absence of available data. These chemicals have not been included in the risk calculations.

Pathways through which populations could potentially become exposed were evaluated. These pathways include: 1) inhalation of the COPCs; 2) ingestion of the COPCs; and 3) dermal (skin) contact with the COPCs. Modeling of groundwater flow was performed for the fractured bedrock and the alluvium. For purposes of the BHHRA, it was assumed that no remedial work would be performed at the Site. This was done so that possible future risks posed by the contamination could be evaluated.

The analyses performed indicated that groundwater impacted by Site contamination presents an unacceptable risk to human health. The calculated human health risks are the result of chemicals released to the environment during the operations of MEW.

IV. Remedial Actions

Remedy Selection

The 1990 ROD for the Site was issued by EPA on September 28, 1990. Remedial Action Objectives (RAOs) were developed as a result of data collected during the Remedial Investigation (RI) to aid in the development and screening of remedial technology alternatives to be considered in the 1990 ROD. EPA's national goal for the Superfund program is to select remedies that will be protective of human health, and the environment that will maintain protection over time, and that will minimize untreated waste. In establishing remedial goals for the Site, EPA considered applicable or relevant and appropriate requirements (ARARs) specific to the contaminants of concern; the HHRA; Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act; and EPA guidance and policy, specifically the TSCA PCB Spill Cleanup Policy, 40 CFR part 761.

Source Control Response Objectives

- Minimize the migration of contaminants from Site soils.
- Reduce risks to human health by preventing direct contact with and ingestion of contaminants in Site soils.
- Minimize the migration of contaminants from the Site to the adjacent wetland.

Management of Response Objectives

- Eliminate or minimize the threat posed to human health and the environment by preventing exposure to soil, air, and sediment contaminants.
- Prevent further migration of soil contamination beyond the then current Site boundaries.
- Restore contaminated groundwater to state of Missouri ARARs, which are considered to be protective of human health and the environment, within a reasonable period of time.

The major components of the source control remedy selected in the 1990 ROD included the following:

1. Preparation of the Site will be performed by clearing trees and vegetation in the area where the incinerator is to be placed.
2. Excavation and on-site incineration of all soils with PCB concentrations in excess of 10 ppm to a depth of four (4) feet and 100 ppm at depths greater than four (4) feet. Excavated soils will be consolidated on-site with provisions to minimize migration of the contaminated materials.
3. Mobilization and set-up of the incinerator at the Site.
4. Conduct trial burn(s) to ensure the operational capabilities of the incinerator.
5. Monitor continuously incinerator feed rates. Frequent monitoring of emissions from the incinerator, both ash and gases, to document compliance with destruction efficiencies and air emissions standards. Testing of the ash residuals from the treatment process will be performed to identify leaching characteristics, to identify the compounds within the ash and to verify that the ash, contains less than 2 ppm PCB.
6. Backfill excavated areas using treated soils, after analytical tests confirm that treatment standards are met.
7. Demobilization of the incinerator from Site when treatment of PCB-contaminated soils is complete.
8. Restoration and revegetation of the Site.
9. Impose institutional controls, such as deed restrictions and/or zoning restrictions, to limit use of the Site to industrial or commercial purposes.

The major components of the migration management remedy selected in the 1990 ROD included (these components were superseded by the remedial action decision made in the 2005 ROD):

1. Perform additional investigation of the hydro-geologic regime in the vicinity of the Site to identify the vertical extent of contamination and confirm the presence or absence of a continuous aquiclude within the upper 200-300 feet of the bedrock.
2. Perform pump tests to determine the flow rates and hydraulic conductivity of the aquifer to gather additional data necessary for the design.
3. Design the extraction well network, including well locations, pump sizes, pumping frequency, location and sizes of connecting piping.
4. Sample water extracted during the pump tests for identification of the contaminants and associated concentrations present in the groundwater.
5. Extract and treat groundwater utilizing an extraction well network and temporary storage followed by removal of volatile organic compounds using an air-stripper with gas phase carbon adsorption from the air stream.
6. Perform Five-Year Reviews to assess Site condition, contaminant distributions, and any associated Site hazards.

An Explanation of Significant Differences (ESD) to the ROD was issued by EPA on February 1, 1995. Technologies (thermal desorption) capable of effectively dealing with the contamination at the Site had been developed and demonstrated successfully. The MEWSC provided information supporting the ESD as a focused feasibility study in October 1994. The EPA reviewed the information and concurred that thermal desorption was a viable remedial alternative. The EPA notified the public of the proposed change, conducted a meeting in Cape Girardeau, Missouri, during December 1994, and issued the ESD. The primary changes documented in the ESD were:

- Changing on-site incineration to on-site thermal treatment.
- Defining on-site thermal treatment to be either incineration or thermal desorption.

The 2005 ROD was issued on September 28, 2005. Two distinct groundwater regimes were identified during the RI: groundwater in fractured bedrock and groundwater in alluvium underlying the wetland area. The EPA's national goal for the Superfund program is to select remedies that will be protective of human health and the environment, that will maintain protection over time, and that will minimize untreated waste. The NCP identifies the remedial action expectations for contaminated groundwater at Superfund sites as:

EPA expects to return usable groundwaters to their beneficial uses whenever practicable, within a time-frame that is reasonable given the particular circumstances of the site. When restoration of groundwater to beneficial uses

is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater and evaluate further risk reduction.” 40 CFR § 300.430(a)(1)(iii)(F).

Based on this expectation, the following general goals are applicable to groundwater remedial actions:

- Prevent exposure to contaminated groundwater which might pose an unacceptable risk
- Prevent or minimize further migration of the contaminant plume
- Prevent or minimize further migration of COCs from source materials to groundwater
- Return groundwater to expected beneficial uses whenever practicable

RAOs define the extent of cleanup required to protect human health and the environment and to comply with applicable or relevant and appropriate requirements (ARARs). ARARs are categorized as action-specific, chemical-specific, and location-specific. The ARARs for the Site, divided by category, are provided as Attachments 2 and 3. RAOs will identify the environmental media, the COCs, exposure pathways, and potential receptors and target cleanup levels (TCLs) for each pathway/receptor.

The following are RAOs for groundwater at the Site:

- Prevent exposure of receptors, both in the upland and wetland areas, to fractured bedrock and alluvial groundwater when COC concentrations exceed TCLs
- Prevent future use of the aquifer underlying the Site as a source of drinking water
- Assess and manage the migration of COCs in the fractured bedrock and alluvial groundwater
- Assess and manage the migration of COCs from fractured bedrock into the alluvium

Two groundwater regimes have been impacted by contamination from the Site. The impacted groundwater is in the fractured bedrock in the upland area and in the alluvium in the wetland area. A remedy has been identified for each groundwater regime.

As discussed above, EPA has determined that, due to the hydrogeological conditions at the Site, it is technically impracticable from an engineering perspective to comply with the relevant and appropriate requirement of achieving MCLs in remediating the groundwater; and accordingly, a TI waiver of this requirement was invoked by EPA in the 2005 ROD.

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The migration management remedy selected for the fractured bedrock groundwater in the 2005 ROD includes the major components of:

- ICs
- wellhead treatment (where appropriate)
- long-term groundwater monitoring

The TI waiver was needed due to the highly variable and fractured nature of the bedrock in the Upland Area of the Site. Since it is not technically practicable from an engineering perspective to remediate the fractured bedrock groundwater, attainment within the fractured bedrock groundwater area of the Safe Drinking Water Act (SDWA) MCLs (40 CFR §141.11-141.14), revised MCLs (40 CFR §141.61 - 141.62), and non-zero Maximum Contaminant Level Goals (MCLGs) (40 CFR § 141.60 - 141.51) are waived for 1,1,1 -TCA; TCE; PCE; 1,1-DCA; 1,1-DCE; 1,2-DCE; benzene; chlorobenzene; 1,2,4-TCB; 1,2-DCB; 1,3-DCB; 1,4-DCB; and PCBs.

ICs will be implemented or imposed as appropriate to prevent exposure to the contaminated groundwater. The primary IC is expected to be proprietary in nature, i.e., an Environmental Covenant that complies with, and is enforceable under, Missouri's Environmental Covenants Act (sections 260.1000-.1039, RSMo). Although EPA believes that an Environmental Covenant is all that would be necessary to protect human health and the environment from contaminated groundwater at the Site, other ICs that might be considered for use at the Site may include the designation of the area of groundwater contamination as a "special use" area by MDNR's Division of Environmental Quality, ordinances limiting resource use, and/or public information. Monitoring of groundwater would be performed. This would be accomplished by obtaining groundwater samples from bedrock wells and performing laboratory analysis on the samples for COCs.

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The migration management remedy selected for the alluvium groundwater in the 2005 ROD includes the major components of:

- ICs
- wellhead treatment
- long-term groundwater monitoring
- injection of EBD agents into the alluvial groundwater (with a contingent MNA remedy, if groundwater conditions allow)

indicate these major components will be addressed as described above for fractured bedrock

The primary IC is expected to be proprietary in nature, i.e., an Environmental Covenant that complies with, and is enforceable under, Missouri's Environmental Covenants Act (sections 260.1000-.1039, RSMo). Although EPA believes that an Environmental Covenant is all that would be necessary to protect human health and the environment from contaminated groundwater at the Site, other ICs that might be considered for use at the Site may include the designation of the area of groundwater contamination as a "special use" area by MDNR's Division of Environmental Quality, ordinances limiting resource use, and/or public information. Monitoring of groundwater would be performed. This would be accomplished by obtaining

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groundwater samples from bedrock wells and performing laboratory analysis on the samples for COCs. Agents to accelerate natural biological processes that degrade or break-down COCs would be injected into the alluvial groundwater. Installation of injection wells will be required.

Contingent Alluvium Technology

During June 2005, the analyses performed on alluvial groundwater samples were expanded to include parameters that are used to determine whether or not degradation of chemicals was naturally occurring. These parameters were monitored for one year. Evaluation of the data indicated that the alluvial groundwater can support natural attenuation. Therefore, it was determined that injection of compounds into the groundwater is not required to attain RAOs.

Remedy Implementation

The CD signed by the EPA, the MDNR, 175 Settling Defendants, and 3 Federal Agencies was referred to the Department of Justice (DOJ) on December 30, 1991. One hundred thirty-four (134) of the Settling Defendants were *de minimis* parties that elected to cash-out their liability with regards to either soil or soil and groundwater response actions. The CD was lodged in the Federal District Court for the Eastern District of Missouri, Southeastern Division, in June 1992. It was approved or entered by the Federal District Court during August 1994. The CD entry was appealed by a group of non-settling former MEW customers during October 1994. The 8th Circuit Court of Appeals reversed the entry of the CD and remanded the CD to the Federal District Court during August 1995 for further deliberation; the CD was approved a second time by the Federal District Court on August 14, 1996. The same group of former customers again appealed the CD entry. The 8th Circuit Court of Appeals confirmed entry of the CD during December 1997.

The Remedial Design (RD) was conducted in conformance with the soils response actions identified in the ROD as modified by the ESD. The RD was conditionally approved by EPA on March 25, 1999.

The MEWSC requested that EPA allow it to further investigate groundwater contamination during late 1990. The purpose of the investigation was to prove the presence of a confining layer (shale) that would inhibit the downward migration of contaminants in the groundwater. EPA agreed to the investigation. Drilling for the new well began in January 1991. A pilot hole was drilled to about 220 feet to verify the condition of the limestone bedrock. This hole was continuously cored within the bedrock; the quality of the rock was good. The location of the new monitoring well (MW-11) was approximately 10 feet southwest of the pilot boring. While drilling, a solution feature was detected at a depth of about 110 feet below ground surface (bgs). Casing was seated in the rock below the void; the boring grouted and redrilled using a smaller diameter drill bit. A second, larger solution feature about 10 feet high was detected at a depth of about 220 ft. bgs. This void was mud-filled; the mud was sampled and PCB contamination of the mud and water was detected. Again the casing was seated in the rock below the void; the boring grouted and re-drilled using a smaller diameter drill bit (this is

referred to as telescoping the hole). A third large solution feature was encountered at a depth of about 315 ft. bgs. This void was also mud-filled. Several thousand gallons of the mud-slurry material within the hole was pumped and then sampled. PCB contamination of the sediment-water mixture and water (the solids were removed using a centrifuge) was detected. The hole was telescoped again. The hole was advanced to a depth of 405 ft. bgs. Groundwater was collected and sampled. PCBs were detected at 2 parts per billion (ppb). (The MCL for PCBs in groundwater is 0.5 ppb.)

The new groundwater information resulted in the identification of a significant data-gap. As a result, the CD provided for the cleanup of the PCB-contaminated soils, in accordance with the ROD, for a focused investigation and feasibility study of the groundwater (additional investigation of the hydro-geologic regime in the vicinity of the Site was be performed), and treatment of the contaminated groundwater within about 70 feet of the ground surface using pump and treat technology. Groundwater response actions identified in the 1990 ROD were not included in the CD due to the lack of information needed for design and cost analysis purposes.

The work identified in the CD took place in two phases: the first was thermal treatment of the PCB-contaminated soils and the second was the focused groundwater study. After several years delay due to legal proceedings, the contract for thermal treatment of the soils was awarded on August 25, 1998. The remedial design was conditionally approved on March 25, 1999. On-Site mobilization, clearing, and grubbing efforts began on June 7, 1999. Thermal treatment of the PCB-contaminated soils was completed on July 25, 2000. The work for the soils operable unit (OU) was finished with the approval of the Remedial Action Report on September 29, 2000. The major components of the soils RA were:

- Clearing and grubbing of the Site.
- Construction of concrete pad for the Low Temperature Thermal Desorption (LTTD) unit.
- Mobilization and set-up of the LTTD unit.
- Excavation of PCB-contaminated soils.
- Screening/processing of PCB-contaminated soils in preparation or thermal desorption.
- LTTD trial runs (process had to meet specified destruction criteria and not create products of incomplete combustion [PICs]).
- Review of LTTD trial run(s) data.
- Approval to treat soils using parameters established during trial runs.
- Excavation of deep PCB-contamination (up to 25 ft. bgs) - all soils with PCB concentrations greater than 100 ppm removed from the Site. (sinkholes were detected on-site, with one being at the location of monitoring wells MW-3, MW-5 and MW-11).
- Modification of excavation plan to leave habitat for pair of nesting red-tailed hawks.
- Production treatment of PCB-contaminated soils.
- Backfill and regrading of Site.
- Revegetation of the Site.
- Pre-final/Final Inspection.

The pre-final inspection concluded that the soils RA had been conducted and completed in accordance with the soils remedial design plans and specifications; a punch list of additional work items was not needed.

The second phase of the work performed pursuant to the CD consisted of the groundwater investigation and feasibility study. Since the decision was made during the soils RA that all PCBs in excess of 100 ppm would be removed, the soils RA acted as a source removal for the groundwater contamination. Upon completion of the thermal desorption activities, the existing groundwater monitoring wells were sampled on a quarterly basis for about two years. During this time, noninvasive investigations were performed to better define the joint patterns within the bedrock. The purpose of the noninvasive work was an attempt to get data to formulate a model of the underlying bedrock. This was made extremely difficult by the fact that the bedrock below the Site is karst; solution features have been carved in the bedrock by the groundwater. It is very difficult, if not impossible, to track contaminants within karst bedrock. A model of the bedrock was created. Additional monitoring wells were installed at those locations most likely to be contaminated. These wells, along with the original wells, were monitored for four quarters. Groundwater data was analyzed and the decision was made that additional monitoring wells were needed near the northern edge of the wetland area. Three sets of wells were installed. All monitoring wells were sampled quarterly for another year. Chlorinated compounds were detected in the samples from the wetland wells. Two more sets of wells were installed further south and west in the wetland area. A third set of wells were planned to monitor groundwater east of the wetland area. These wells were not installed due to lack of alluvium in this area. A focused remedial investigation and feasibility study was then submitted to EPA.

EPA and the state of Missouri have determined that all work identified in the CD has been substantially performed. A Consent Decree (1:95CV0041) with Missouri Electric Works, Inc. and the estate of Richard Giles required that a notice be attached to the property deed for the MEW real estate. The deed notice was to restrict the use of the property. Only commercial and industrial uses are to be allowed, with no food handling or child care activities. The estate of Richard Giles filed the Consent Decree with the Recorder of Deeds, Cape Girardeau County on June 16, 2005. EPA issued a separate Record of Decision for groundwater in 2005 (2005 ROD).

System Operation/Operation and Maintenance

Representatives of the MEWSTD conducted the monitoring and maintenance activities with regard to the vegetative cover over the treated soils. About a year after constructing the cap, a Site visit was made to observe the condition of the cap, identify any erosional features, and assess the success of vegetating the cap. Several erosion rills were identified and filled, new grass seed was planted, and erosion barriers (rock-filled gabions) were erected along the eastern-most edge of the Site.

No long-term operation and maintenance activities were required in the CD. There are no operation and maintenance activities being performed.

V. Progress Since the Last Five-Year Review

First Five Year Review Issues and Recommendations

Issue	Recommendations/Follow-up Actions
Continuing erosion along the eastern perimeter of the Site	Annual inspections; repair of slope if necessary
Institutional controls not placed with regards to soils	No action
Institutional controls not placed with regards to groundwater	Have institutional controls placed on property to prohibit groundwater use
Ecological risk assessment not conducted for wetland area south of MEW facility	Prepare an Ecological Risk Assessment after performing a focused RI in the wetland area
Insufficient groundwater monitoring to determine whether or not plume is migrating	Monitor groundwater, especially in wetland, for an extended period to determine migration
Insufficient groundwater parameter data to determine whether natural attenuation is occurring	Monitor groundwater for an extended period of time to evaluate potential for attenuation

First Five Year Review Protectiveness Statement

The soil remedy is protective of human health. The groundwater portion of the remedy has not been implemented. The groundwater could present a risk to human health through ingestion or inhalation. New standards have been instituted for ecological protectiveness since the ROD was written. Additional work needs to be performed to determine whether or not there is an ecological risk.

Additional sampling and monitoring of the groundwater will be performed to evaluate the migration of the contaminant plume below the wetland area and to evaluate the potential of natural attenuation of the contaminants of concern. An investigation will be performed to gather the data necessary for the Ecological Risk Assessment. A determination will be made after the Ecological Risk Assessment is complete as to whether or not additional actions will be required for protectiveness of the environment.

Since the first Five-Year Review for the Site, the following have occurred:

- A groundwater RI/FS has been completed.
- The 2005 Record of Decision has been issued.
- An investigation of the ability of the alluvium groundwater to support MNA has been completed.
- An Ecological Risk Screening Evaluation was completed in June 2005.
- An Expanded Ecological Risk Screening Evaluation was completed in June 2006.
- Fencing and signage of the wetland pond area has been completed.
- Special Notice Letters have been issued for the RD/RA for OU 2 and the RI/FS and RD/RA for OU 3.
- A Good Faith offer has been received from the MEWSTD.
- CD negotiations for work at OU 2 and OU 3 have commenced.

VI. Five-Year Review Process

Administrative Components

Members of the MEWSTD and the community were notified of the Five-Year Review during February 2009. The MEW Five-Year Review was performed by Daniel Kellerman and Pauletta France-Isetts, EPA Remedial Project Managers. Don Van Dyke, Project Manager, Missouri Department of Natural Resources, assisted in the review as the representative for the support agency.

The review schedule components included the following:

- Community involvement
- Document review
- Data review
- Site inspection
- Local interviews
- Five-Year Review report development and review

These efforts were performed from December 2008 through June 2009.

Community Involvement

Activities to involve the community in the Five-Year Review were initiated with a meeting in January 2009 between the RPM Kellerman and the Community Involvement Coordinator (CIC) for the Site. A notice was sent to the “Southeast Missourian” in Cape Girardeau (the local newspaper), that a Five-Year Review was to be conducted; this notice was published on March 1, 2009. A fact sheet was sent to Federal and State of Missouri Legislators on February 27, 2009. The fact sheet was also mailed to 348 interested parties from an updated mailing list. The Fact Sheet invited the recipients to submit any comments to EPA. Following execution by EPA, the Five-Year Review report will be available to the public at the Cape Girardeau Public Library and the EPA Region 7 office.

functional although minor damage to several protective covers was observed, damage likely the result of mowing/weed-eating. Lock replacement for the wells is recommended based on the rusted condition and appearance. Trees and shrubs are growing around several wells that could result in damage to the well casing which could compromise access. Access to the property was not secured along Kingshighway but is recommended to prevent unlawful entry or dumping and to further protect the monitoring wells from trespassers. The nest of the red-tailed hawk(s) remains in place along the eastern perimeter of the Property; two hawks were observed nesting during the March 18, 2009, Site visit, each was active and quite vocal.

No institutional controls were placed on the areas addressed by the soil RA for OU 1. The soils were excavated to PCB-concentrations less than 10 ppm. The ROD identified leaving PCBs at concentrations of up to 100 ppm at depths below 4 feet. The original removal plans were reconsidered and the excavation was expanded to depths exceeding the original 4 foot destination depth to where no PCB concentrations exceeded 100 ppm; the need for institutional controls for soil contamination no longer exists.

Wetlands

The greater wetland area is not secured other than the placement of a chain link security fence and signage intact surrounding the pond. The gate was locked and no location of physical damage to the fencing was observed other than small diameter trees which have fallen across the top of the fence along the west side. The fallen trees could represent a slight compromise to the accessibility component of the structure since the barbed-wire strands are compressed down on the top fence rail. However, no evidence of trespassing was observed.

Interviews

Interviews were conducted with some parties connected to the Site. No significant problems regarding the Site were identified during the interviews.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes.

The review of documents indicate that the soil RA is functioning as intended by the ROD and ESD. However, PCBs have been discovered in the groundwater at depth, and no RA has been taken to address the threat posed by groundwater.

The remedy for OU2 is not yet functioning. Implementation is not possible since the CD is still being negotiated. The remedy for OU3 (wetland) has not been selected. A security fence was constructed around the wetland pond to minimize potential human exposure to the aquatic life that may be contaminated with PCBs.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Yes.

The exposure assumptions for human health remain valid. Little change has been made to the toxicity data and cleanup levels for PCBs although more data is becoming available on reproductive toxicity for PCBs now than in 1990. The RAOs for the soil cleanup remain valid and there are no known newly promulgated standards calling into question the protectiveness of the remedy.

Changes in Standards and To Be Considereds

The estimate of ecological risk has been formalized since 1990 when the 1990 ROD was issued. PCBs bio-accumulate and bio-magnify in the food chain. Screening levels for PCBs are quite low. There are no revisions, newly promulgated standards deviating from those in the ROD, or TBCs used in selecting the cleanup levels at this Site calling into question the protectiveness of the remedy.

Changes in Exposure Pathways

The exposure assumptions used to develop the soils portion of the 1990 HHRA and the 2005 BHHRA included both current and future exposures (child recreational, child residential, adult recreational, adult residential and adult worker). Land use changes at the Site and in the immediate vicinity have not affected the exposure pathways of the Site. No new human health or ecological routes of exposure or receptors have been identified, nor have any newly identified contaminants or contaminant sources. There are no known unanticipated toxic byproducts of the remedy not addressed by the OU 1 soil decisions documents. Physical Site conditions have changed little, if any. The MEW property structure remains vacant. There have been no new changes in the understanding of the Site conditions which would adversely affect the protectiveness of the remedy.

Changes in Toxicity and Other Contaminant Characteristics

Little change in the toxicity factors for the contaminants of concern or other contaminant characteristics that were used in the HHRA have occurred since the 1990 ROD. These assumptions are considered to be conservative and reasonable in evaluating the human health risk and developing human health risk-based cleanup levels. No changes to the assumptions, or the cleanup levels developed from them, are warranted to protect human health.

Changes in Risk Assessment Methods

Baseline Risk Assessment now includes human health and ecological risk assessment. Ecological risk was not estimated in 1990. Investigation of the wetland surface soils, sediments, surface water and soils within approximately four feet of the ground surface should be sampled and analyses performed to evaluate the risk, if any, to the environment posed by the contamination.

Expected Progress Towards Meeting RAOs

The RAOs for soils have been met. Implementation of the remedy for groundwater is pending.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.

Several karst features were detected at, near or below the Site after the 1990 ROD was issued. Two sink-holes were found; one off-site and the other near the location of MW-3, MW-5, and MW-11A. During the installation of MW-11A, subsurface voids (solution features) were encountered at depths of 110 feet bgs, 220 feet bgs, and 315 feet bgs. This information has resulted in a technical impracticability waiver (TI waiver) being selected as a remedy component in the 2005 ROD.

Technical Assessment Summary

According to the data reviewed, the Site inspection and the interviews, the soil remedy is functioning as intended by the ROD, as modified by the ESD. The groundwater remedy has not been implemented. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the soil remedy. The ARARs for soil contamination cited in the ROD have been met. There have been no changes in the toxicity factors for the contaminants of concern that were used in the HHRA. There has been no change in the standardized risk assessment methodology for human health. There has been a change in the standardized methodology for ecological risk; this could impact the protectiveness of the remedy. A groundwater RI/FS has been completed and the 2005 ROD identified the selected remedial actions. The selected remedial actions for groundwater at the Site have not been implemented; the consent decree negotiations for these efforts are on-going. Risk posed by groundwater still exists.

Potential threats to wetland populations have been indentified through biota and sediment sampling. A remedy selection is needed for OU 3 where additional data collection is necessary.

VIII. Issues

Table 2 – Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
March 06 Institutional controls for groundwater not placed	N	Y
Insufficient monitoring frequencies for groundwater: fractured bedrock and alluvium	N	Y
Ecological risk assessment not conducted for wetland area south of the MEW facility <i>Penissa</i>	Y	Y
Additional sediment/soil assessment needed to determine whether PCBs are present in the wetland area	Y	Y
Maintenance to secure the property, replace monitor well locks and remove compromising vegetation, and maintain security fencing	N	Y

5 sampling events
10/10/03 & 05
June 05 - 1/4/1
June 12 - 1/4/1
April 13

IX. Recommendations and Follow-up Actions

Table 3 – Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Institutional controls not placed with regards to groundwater	Implement institutional controls to prohibit well drilling in and use of groundwater	property owner(s)/ City of Cape Girardeau State of Missouri	State/ EPA	Sept. 30, 2010	N	Y
Insufficient monitoring frequencies for groundwater: fractured bedrock and alluvium	Implement schedule for groundwater monitoring (to be set forth in the Consent Decree)	PRPs	State/ EPA	Sept. 30, 2010	N	Y

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Ecological risk assessment not conducted for wetland area south of the MEW facility	Use data obtained from wetland investigations to prepare an Ecological Risk Assessment to determine whether there is an unacceptable risk to the environment	PRPs	State/EPA	Sept. 30, 2012	Y	Y
Additional sediment/soil assessment needed to determine whether PCBs are present in the wetland area	Conduct a focused RI in the wetland area to determine the extent of PCBs	PRPs	State/EPA	Sept.30, 2011	Y	Y
Maintenance to secure the property, replace monitor well locks and remove compromising vegetation, and maintain security fencing	Implement security measures and maintain the integrity of the monitor wells and fencing	PRPs	State/EPA	Sept. 30, 2009	N	Y

X. Protectiveness Statement

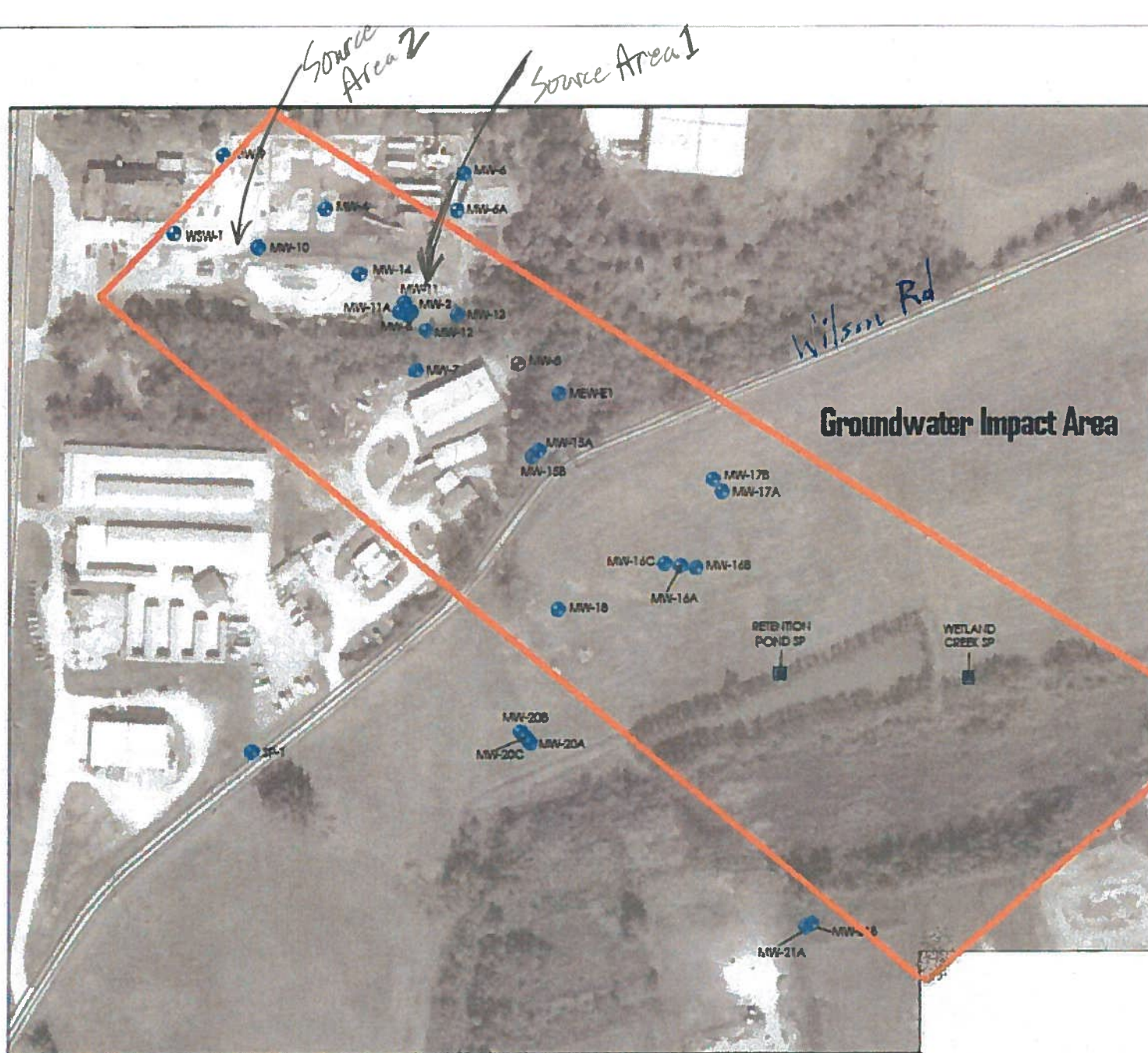
The remedy at OU 1 is protective of human health and the environment. All exposure pathways and risks are controlled and the remedy continues to function as intended by the 1990 ROD and 1994 ESD. Exposure assumptions, cleanup values, toxicity data, and the RAOs remain valid.

The remedy at OU 2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

A protectiveness determination of the remedy at OU 3 cannot be made at this time until further information is obtained. Further information will be obtained through the collection of data to determine the ecological risks for the Site. It is expected that these actions will take approximately three years to complete, at which time a protectiveness determination will be made.

XI. Next Review

The third Five-Year Review for the Site is required by June 2014, five years from the date of this review.



from KOMEX Remedial
Investigation Report, 2005

Missouri Electric Works Site
Estimated Area Impacted by Groundwater Contamination

Figure 3

from KOMEX Remedial Investigation Report, 2005

**Missouri Electric Works Site
Wetland Area**

Figure 4

